



## PROJECT FICHE FOR INVESTMENT MEASURE

<b>Municipality</b>	<b>Plovdiv</b>
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### 1. Name of the investment measure

Rainwater drainage through a complex ecological solution of dammed critical sections of the road infrastructure

### 2. Summary – general short description of the measure

In the event of intense precipitation, floods occur, caused or exacerbated by the sewerage systems. Thus, water quantities are formed, which should be discharged safely without using the existing sewerage system which is not dimensioned for the urban environment growth rates.

Critical sections of the road infrastructure have been identified along Maritza Blvd. - South and North, on which as a result of intense precipitation water catchments are formed. The objective of the measure is to prevent the flooding of these areas in the event of heavy rainfalls.

Rainwater drainage, avoiding the use of the sewerage system, is a possible measure, which is applied through exclusion of the ineffective rainwater intake shafts and building a rain discharge channel that leads the rainwater directly into Maritza river.

The investment measure is a linear site. The proximity of the river to the road infrastructure is a prerequisite for the implementation of rainwater drainage of flooded critical sections of the road infrastructure through:

- construction of rainwater drainage facilities and drainage of rainwater into the Maritsa River at two critical locations;
- construction of a suitable rainwater collection facility, from which to irrigate nearby green areas at the one critical location.

It is envisioned to install level regulators and level sensors in the rainwater discharging channels for the purpose of monitoring the ecological solution. The data, that will be generated, will be entered into a database, for which hardware purchase and software





development is planned. Setting up video surveillance for the passenger traffic is also envisioned.

In order to ensure sustainability of the population awareness, one information component is envisioned to be added to the climate change adaptation measures. As a means for attracting the attention of the adolescents, attractive elements will be built at two of the posts. They will keep the attention on the educational information. Through a QR code online information on climate change adaptation activities will be provided. The focus will be on guidelines and good practices, including the implemented measure for preventing stormwater caused damages associated with water volumes resulting from heavy rainfalls.

The proposed solution will ensure safe transport traffic flow along key transport sections of Maritza Blvd. - South and Maritza Blvd. - North. Rainwater drainage, avoiding the use of the sewerage system through exclusion of the ineffective rainwater intake shafts and building of a rainwater discharge channel, leads to a solution to a particular problem within identified neuralgic points of the passenger traffic. This will ensure improved access and spatial connectivity in the urban environment.

Setting the start of a monitoring system to detect the discharge of the rainwater directly into Maritza river will generate a database to enable the drafting of a Stormwater handling manual.

The training of the population on the challenges faced by cities, which are coping with the climate change, will be ensured by the attractiveness of urban design elements with artistic value. The aim is to provide an opportunity to take a picture (“selfie” type), which will capture the surrounding environment, including QR code with data on the challenges related to climate change and to the project.

### 3. Object and place

According to “Regional Master Plan for water supply and sewerage on the designated territory of Water & Sewerage EOOD (W&S EOOD)– Plovdiv”, collectors I and IV are in the worst condition. In the event of a heavy rainfall the latter operates under pressure flooding neighboring buildings and streets. In 2003, the collector had been clogged 35 times and had flooded the road, the crossroads and the basements of the neighboring buildings. This problem affects approximately 100,000 people. The proposal for the investment measure therefore covers neuralgic sections of the road infrastructure that create water catchment areas resulting from intense rainfalls. These are the underpasses under bridge structures connecting the south and north part of the city, as follows:

- Underpass under railway “Plovdiv-Karlovo” / Koprivshtitsa Blvd. /, Maritza Blvd. - South;
- Underpass under V. Aprilov Blvd, Maritza Blvd. - South;
- Underpass under Ruski Blvd., Maritza Blvd. - South;

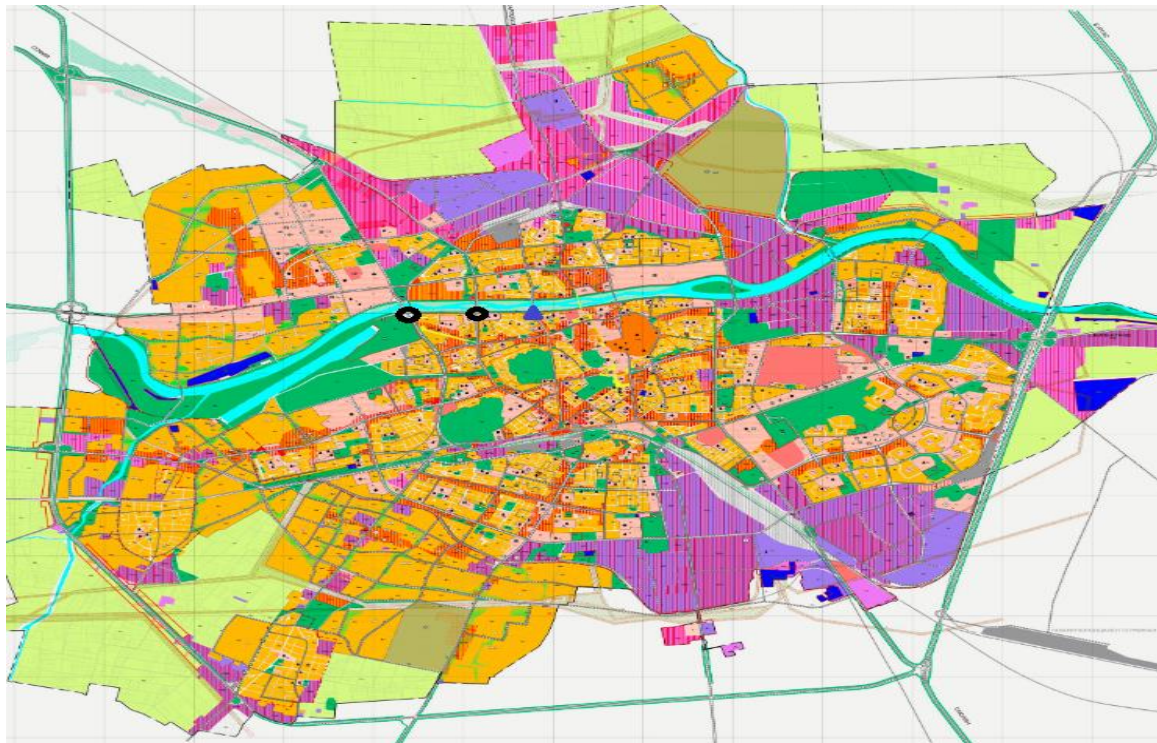
The measures can be replicated in other parts of the city, implementing a transport node built of overpasses and underpasses in the Southwestern part of Plovdiv, where water catchments are formed as a result of intense rainfalls, such as:

- Underpass under Adata Bridge, Maritza Blvd. - South;



- Underpass under Gerdzhika Bridge, Maritza Blvd. - North; • Underpass under the Pedestrian Bridge, Maritza Blvd. – North.

Map with locations of the rainwater drainage places.



#### Keys:

● construction of a rain discharge channel that leads the rainwater directly into Maritza river in two places: the underpass under the Plovdiv-Karlovo railway line / bul. "Koprivshitsa"/, "Maritsa" blvd. - south and the underpass under "V. Aprilov", "Maritsa" blvd. - south;

▲ construction of a suitable rainwater collection facility, from which to irrigate nearby green areas next to the Maritsa River, from the underpass under "Ruski" Blvd., "Maritsa" Blvd. - south

#### 4. Activities

The following activities are envisioned:

1. Design of the structural and technological solution for a complex ecological solution:
  - construction of rainwater drainage facilities and drainage of rainwater into the Maritsa River at two critical locations – the underpass under the Plovdiv-Karlovo railway line / bul. "Koprivshitsa"/, "Maritsa" blvd. - south and the underpass under "V. Aprilov", "Maritsa" blvd. - south ;
  - onstruction of a suitable rainwater collection facility, from which to irrigate nearby green areas at the one critical location from the underpass under "Ruski" Blvd., "Maritsa" Blvd. – south, where the water will be used for watering of the green areas near Maritsa river..





2. Awarding the drafting of documents pursuant to the procedure included in Chapter IV of the Environmental Protection Act (EPA) and the Water Act (WA).
3. Implementation of the measure - construction of a rain drainage channel in the four designated sites, accounting for the following characteristics:
  - The concrete place is determined by the lowest point of the underpass from the south / north **regulation line** of the road lane with the relevant elevation, where the existing rainwater intake grids are located.
  - Protection of tree species in the green area along the dyke of Maritza river and the river bed itself.
  - Non-conflict non-overlapping with the existing water pipeline Ø 600 in the green area along the dyke. The hydraulic capacity of the triple-grid street run-off can be indicatively determined on the basis of the hydraulic conductivity of a single street run-off 500 / 500 mm, which has been established in the hydraulic laboratory of the University of Architecture, Civil Engineering and Geodesy (UACEG) and amounts to 19.5 l / s in case of water layer height 22 mm above the pig iron grid. In the absence of hydraulic resistance from a waste basket and drainage aperture Ø 150 mm and upon availability of 200 mm water layer under the pig iron grid, it can be estimated that the hydraulic capacity of a grid is about 70-80 l / s. In this connection, a triple-grid street run-off is suitable for a water intake facility.
4. Development of technical specification for hardware and design of software, including information on:
  - Location of the positioning in the rainwater dischargers of level regulators and rainwater level sensors;
  - Sensor management cluster box;
  - Database on the number of times a water column passes through the rainwater drainage channel;
  - Visualization of the sensors' data and of the video surveillance at the Mobility Center of Plovdiv Municipality and upon demand at some more job places.
5. Conducting training of experts on working with the rainfall data base.
6. Design and implementation of one element of the urban design with artistic value and provision of opportunity for taking pictures (“selfie” type) capturing the surrounding environment, including QR code with data on the climate change challenges and the project.

## 5. Threat, with regard to which adaptation is performed

The research works related to the climate change show that, both due to the natural cyclicity of the natural processes and as a result of the anthropogenic impact through an increase in the greenhouse gases, the climate changes are a factor for increasing the flood risk. The results are visible to all - higher levels of heavy rainfalls, higher number of days during the year with short-term precipitation above critical threshold values, etc.

Plovdiv municipality falls within an area of potential significant flood risk (APsFR) with code BG3 APsFR MA 05. During the second cycle, a new type of flooding has been identified: fluvial, flash flood, urban flood (Plovdiv city).





A contribution to the effects of the threat from intense rainfalls has also been made by the insufficient diameter of the urban sewage pipe network, designed and constructed in the 1930s and 1940s. The same is of mixed type and does not meet the rising current needs and loads. Dimensioning parameters - 220 l/s / ha for a 3-year period of overloading have been used. At present, the rainwater intensity in the area is 314 l/s/ ha. For this reason, even in the event of a medium-intensity rainfalls, the city sewerage system is full and working under pressure, flooding underpasses, which have been identified as critical parts of the road infrastructure.

A complex ecological solution related to the risk of drought and change in the rainfall cycle is being implemented.

## 6. Used experience from Norway and/or from the Report on good practices:

Key to the infrastructure measure selection in Plovdiv was the presentation of the Norwegian Research Centre on Sustainable Climate Change Adaptation (Noradapt) and the presentation on the role of the Norwegian Water Resources and Energy Directorate (NVE) in relation to flood prevention, landslides and stormwater management. The focus of the presentation with a view to the identification of a future potential for Plovdiv Municipality is the development of land use planning and stormwater management document.

This topic has been addressed in the Report on international experience and best practices for climate change adaptation, which are suitable for the Bulgarian cities – Part 6 "Urban Flooding" with example: Strategic planning and practical measures for stormwater management in Oslo.

The choice of the complex ecological solution for the use of rainwater was influenced by the experience of Poland, where it was launched by the city council as a pilot project in August 2019 (Covenant of Mayors, 2020, Catch the Rain Program). The program provides grants to citizens for sustainable stormwater management on their own land. The grant can be up to 80% to implement a rainwater storage solution. Possible installations include underground and above-ground freestanding stormwater storage tanks, rain gardens, and absorbent wells. The expenses for the purchase, construction and mounting of the elements, needed for the storage and use of the rain water are also included, but are limited to 1130 EUR per measure.

## 7. Innovation:

The rainwater drainage, avoiding the use of the sewerage system, has not been applied in the Plovdiv Municipality so far. The exclusion of the dimensioned mixed sewerage system for medium-sized precipitation quantities by discharging the rainwater directly into Maritza river, instead of the ineffective rainwater intake shafts, which is the city's usual practice, is an innovative measure that is being proposed for the first time. The construction of rainwater discharge channels is an appropriate good practice for climate change adaptation in Plovdiv Municipality. The specificity of the city implies replication of the investment measure upon availability of appropriate strategic planning at the local level as a practical measure for stormwater management.





Implementation of the complex solution for rainwater drainage, taking it to an underground reservoir and using it for irrigation is a new practice for the Municipality of Plovdiv.

## 8. Indicative budget of the project idea:

The indicative value for the project idea implementation is BGN 485 045 ( VAT included):

- Total value for design, monitoring systems, author’s supervision and construction & installation works (CIW) – BGN 475,780.00(VAT included), out of which:
  - Design and author’s supervision of the structural and technological solution for:
    - construction of rainwater drainage facilities and drainage of rainwater into the Maritsa River at two critical locations;
    - construction of a suitable rainwater collection facility, from which to irrigate nearby green areas next to the Maritsa River, from the underpass under "Ruski" Blvd., "Maritsa" Blvd. - south;
    - with included author’s supervision – BGN 70,000 (VAT included);
  - Assigning the development of documents pursuant to the procedure included in Chapter. IV of EPA and WA – BGN 5,380 (VAT included);
  - Implementation of 3 solutions –BGN 298,400
  - Purchase and installation in the rainwater drainage channels of level regulators and rainwater level sensors – BGN 11 000.;
  - Hardware purchase – BGN 10,000
  - Developing software with a rainwater database – BGN 70 000.
  - Design of 1 pc. element of the urban design with artistic value – BGN 1 000 (VAT included) for 1 pc.;
  - Construction of 1 pc. element of the urban design with artistic value – BGN 10 000 (VAT included) for 1 pc.;
  - Investment control and construction supervision –BGN 9 264.37 (VAT included)

## 9. Project readiness:

In 2018, a feasibility study was performed for the drainage of underpasses along Maritza Blvd. - South under railroad line (Koprivshitzta Blvd.), under Vasil Aprilov Blvd. and Ruski Blvd. into Maritza river in Plovdiv city, Plovdiv municipality, Plovdiv district - i.e. rainwater discharge in Maritza river, within whose framework a procedure under Chapter VI of the Environmental Protection Act was carried out. Assessment of the compatibility with the River Basin Management Plan and the Flood Risk Management Plan were performed by the East Aegean River Basin Directorate. The competent water management authority declared that the investment intention was eligible. The Regional Inspectorate of Environment and Water - Plovdiv issued an opinion No EIA - 2020-3 / 08.11.2019, which is also valid and applicable with regard to the proposed technology.

## 10. Procurement mode:





A public procurement procedure is envisioned through the conducting of a "public competition" pursuant to the procedure under Art. 1 (8) al.1, para 12 of PPA with a subject: "Engineering - design, construction and author's supervision for accomplishing rainwater drainage of dammed critical road infrastructure sections as a result of intense rainfalls, by building rainwater discharge channels" applying lots.

Direct awarding will be accomplished for:

- Preparation of documents pursuant to the procedure included in Chapter IV of the EPA and WA;
- Design and building of 1 pc. of urban design element with artistic value

A public procurement procedure is envisioned for contract awarding for Software development and construction of rainwater databases and the purchase and installation of level regulators and sensors for the level of rainwater in accordance with a procedure under Chapter 26 of PPA.

## 11. Compliance with the municipal policies – plans, strategies:

- **Municipal Integrated Development Plan (MIDP) Plovdiv 2021 – 2027**

Volume II – Strategic Framework

Table 6.3.1. – Measures for climate change mitigation, page 147

Direction “Decarbonization”

Sector “Transport”. Rehabilitation and modernization of the existing road infrastructure for providing optimal speed and optimal management modes of the automobile engines.

Measure 1.3. The conservation and sustainable management of the water resources provides for a group of projects relevant to the conservation and sustainable management of the water resources, including water supply networks and systems with a reflection on the quality of the potable water, as well as sewerage systems with reflection on discharge and treatment of rainwater and waste water, and consequently - provision of quality public services to the population of the city as well as environmental protection, namely: Group of projects for climate change adaptation through flood risk management – the intervention envisages activities and investments for draining underpasses, as well as flood risk management measures based on the projections contained in the Flood Risk Management Plans (FRMPs).

- **Regional Master Plan for water supply and sewerage** on the designated territory of W&S EOOD – Пловдив – measures and findings related to collectors I and IV

## 12. Synergic effect and relation to other implemented or planned projects in the urban area:

On 07.04.2022 the municipality of Plovdiv, together with 11 other partners, based on approved Concept Note, submitted to the EU a complete project proposal for Integrated Project BULADAPTECOS for funding under the LIFE program. The project will contribute to the implementation of the National Climate Change Adaptation Strategy by 2030 through



concrete activities in the East-Aegean River Basin, which is the second largest and the most diverse river basin in Bulgaria.

The project will also build synergy with the flood risk management and will reach a national coverage with regard to raising the awareness of climate adaptation, capacity building and networking. The measure implementation is aimed at reducing the risk of flooding on the territory of Plovdiv Municipality and the municipalities within the scope of the APSFR with code BG3 \_ APSFR \_ MA \_ 05.

The possibility to implement the activities foreseen in the investment measure included in the Project fiche are complementary to the activities under the LIFE program with acronym BULADAPTECOS. Both project proposals focus on a common solution in synergy with implementation of climate change adaptation measures and climate related flood risk prevention and management: floods, in this number for raising the public awareness, civil protection and building on local disaster management systems, infrastructure with applied ecosystem approaches.

As any integrated project under the LIFE program, BULADAPTECOS is also aiming at mobilizing additional funding to achieve its objectives by integrating them into other related projects and into measures from funding programs within the framework of the new programming period 2021-2027.

### 13. Results from the consultation meeting

The meeting took place on 28 June 2022 in the hall of the House of Culture “Boris Hristov”. It was attended by experts and heads of various directorates and departments of the municipal administration, including managers and experts of the district administrations, as well as representatives of the Regional Health Inspectorate (RHI), Chamber of Architects, Chamber of Engineers, Chistota Municipal Enterprise (ME), Parks and Gardens ME and media.

The meeting was opened by Mr. Anesti Timchev – Deputy Mayor of the municipality. He underlined the usefulness of the project solutions. He also noted the need to continue the partnerships created through the project. Following a short presentation on the NTEF role and the project philosophy, the manager of the expert team under the project from Plovdiv municipality presented the proposed innovative measure, as well as the process through which the expert team had passed to reach achieve its finalization and justification.

Opinions in support of the proposed measure were expressed during the discussion. In parallel with that, the attention was drawn to a few more points in the city, where it would be necessary to apply the same measure (involving discharge of the abundant rainwater directly into the Maritza river), as well as at other places, for which it would be necessary to search for another technical solution because of their location at a long distance from the river.

Special attention was paid to the rainwater reuse techniques for the green areas’ irrigation. The answer was that, in Plovdiv, the groundwater was very high and abundant and that it was much more cost-efficient to drill water boreholes for this purpose.

The question related to the heat island effect was also raised. Greening solutions using appropriate vegetation species were proposed.







A suggestion has been made for a legislative amendment referring to changes in the standards related to the greening share in the industrial zones of the cities.

Architect Bozhkov, site director and member of the project expert team provided information on the new rules in the new **Master Plan** of the city, in which the ideas for rainwater collection would be implemented, where necessary and possible, increasing the area with large-size vegetation, imposing restrictions for the underground construction, which seriously compromises the possibilities for greening **and the active "city-river" connection.**

The meeting was very fruitful, both for the project and for future ideas.

#### 14. Anything else, specific for this measure:

Implementation of the envisaged investment measure will ensure the normal movement of private motor vehicles and buses of the urban mass transport, which is a contribution to the needs of the local residents.

The valuation of natural and social costs and benefits enables the assessment not only of the significance of the individual projects, but also of the overall activity of the municipality to ensure the comfort of the population.

Public education and public awareness fosters the implementation of projects with significant environmental and social benefits with regard to the climate change adaptation of the urban environment.

The good environmental management creates a good social environment - people want not just to exist but to have good wellbeing. Good transport links and personal satisfaction are the things that make social life worthwhile, which is the aim of the investment measure included in the project fiche.

